SAGE OF THE DESERT

JONKER AND THORNBER

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THE SAGE OF THE DESERT

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THE SAGE OF THE DESERT

AND OTHER CACTI

STUDIES OF THAT FANTASTIC CLAN, THE CACTUS OF THE DESERT, AND OTHER INTERESTING AND PECULIAR DESERT GROWTHS

BY

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INTRODUCTION BY

HAROLD BELL WRIGHT

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To

THE MEMORY OF MY DEAR FATHER

GEORGE V. BONKER

A STUDENT AND A LOVER OF THE
BEAUTIFUL IN NATURE

F. B.

Preface

IN this little book some of the weird fantastic growths of the American Desert have been pictured in a popular way, and with an accurate scientific foundation of fact and detail. It is the first time that many of the odd, grotesque plants of our wastes of desert land have been described, either in a popular or scientific treatise, and we have selected some of the most interesting as well as the more important of our desert creations. To and expressly for those who love the flower-tinged panorama of the glorious Great Out of Doors, when the Sun's first kiss of Spring beckons plant and flower life to come forth and shake hands with the World, and thereby to express all that has transpired during that interim of sleep when Winter was on; for those who love to tramp the desert wastes and the mountain washes in search of delicate colorings, or of sordid lifeless growths in the out of way places or byways, sun-baked areas where plant life is least to be expected; for those who cannot go out on these little excursions, yet who are lovers of Nature and desire to study desert life as they know it not but suspect it to be, this little book

is written. No attempt is to be made here to clothe these matters in the scientific regalia of botany, except to the extent of saying what is what, and perhaps why. The mathematics of botany bring forth certain facts, at first theoretical, then left to research to prove or discard. Nature does not play with uncertainties, and where theory is brought forth the researcher must go forth into the field to experiment with Nature, to hunt for and select the oddest, most peculiar plants, in order to ascertain with exactitude what manner of life will come forth under given conditions: for instance when left alone in the wild state, or when cultivated and nursed along to maturity. Environment, habitat, and association of plants with their kind play their part in plant existence. So also to the end of presenting certain simple facts of structure and design, and of experiment and result, to the general public, this work goes to press.

We take this opportunity to express in terms of deep appreciation the gratitude we feel for the help of Dr. Walter T. Swingle in the Giant Cactus Forests on the Papago Indian Reservation; for the enthusiasm Mr. Harold Bell Wright has shown for these studies herein described and his splendid co-operation in preparing the Introduction for them; for the many, many, earnest

letters received requesting the publication of this little book. We wish also to thank the *Ladies' Home Journal* for permission to reprint the chapter "Desert Flowers" and Introduction, published in the April issue, 1930, of that splendid magazine; Mrs. John Wilmot Estill for paintings, herein, of the Sahuaro and Palo Verde, and the Night Blooming Cereus; and Evelyn Thornber for the cover design of the Sahuaro and Yucca.

JOHN JAMES THORNBER,
Tucson, Arizona.

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November 1, 1930.

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Introduction

IN a great Eastern city, an artist said to me: "I am told that you live in the desert."

"Yes," I returned humbly, "I do."

"But I don't understand," he said—with an air—"what inspiration can one possibly find in a desert?"

"Have you ever been west of the Mississippi?" I asked.

"No."

"Then," said I gently, " it would be useless for me even to attempt to tell you about it—*you* could not understand."

Indeed, I was not trying to be rude; I merely expressed the feeling of helplessness which always comes over me when I am asked to tell why I love the desert or what it means to me.

One can, of course, say the usual things: Turquoise skies, far horizons, vast reaches of level mesas, wide valleys and rolling hills—blue-veiled mountains with tinted peaks, gray granite crags and purple-shadowed canyons—flaming wonder of the sunset, still mystery of the star-crowded night, gentle majesty of the morning, golden glory of the sun-filled day. But when all this is said there is something more which cannot be

told but is only to be felt as one feels a "still small voice" speaking without words in the hidden depths of one's soul.

Least of all can one describe the desert in blossom time. I have seen an almost unbroken carpet of living color—an infinite variety of shade and hue—extending as far as the eye could reach. I have seen the foothills, thirty miles away, turned to solid gold by wild poppies. I have counted, in a space four feet square, fourteen varieties of wild flowers. I have seen the desert when one could not put foot to the ground without crushing a blossom. It should be said, however, that this wealth of bloom comes only when we have been blessed with abundant winter rains. It does not happen so when the winter months are too dry.

But the cactus blooms—rain or no rain. These strange, grotesque, forbidding and evil-looking plants seem to defy all laws of blossom making. One marvels that they manage even to live. Indeed, many of them—bare green or brown sticks, without sign of leaf—seem not to be alive. But when their time is fulfilled, no matter how unfavorable the season, they burst forth with offerings of breath-taking loveliness.

I wonder, sometimes, if certain laws of human character development do not apply in this

strange vegetable kingdom also. Have you not noticed how often among human plants those that have been forced to fight hardest for a bare existence flower in rarest beauty? It is almost as if loveliness were the child of bitter hardship and travail.

It seems so easy for the rose bush in my lady's garden to bring forth beauty; for the cactus to bloom is a miracle. I like to think that God, who is God of both the garden and the desert, gives to the cactus this beauty, rare and fine, because it has fought a good fight.

Among those who know the desert, none, I think, can speak of these strange plants with greater knowledge than my good friend, Dean Thornber, of the University of Arizona.

The Sage of the Desert

Introduction

IT is just about dusk and the purple haze after the dying day is settling over the desert, and we who are privileged to be journeying through this strange land, the Papago Sahuaro Forest of Arizona, are to enjoy a great surprise when the first ghostly figures appear in the dim light. It is a picture that will not soon be forgotten as we roll down the dusty highway in our gray dust covered car and thirsty with many miles behind us, on one side wide open rolling desert country, on the other rising, with buttes and cliffs; and all around there is the familiar desert vegetation, with here and there a tree of some strange sort, and the "blue sunset," awe-inspiring and creepy in the aspect of night shadows with ghostly design and pattern. It is just before the shades of night begin to fall and we have noticed that the constellations in the firmament of heaven are standing at attention. Soon the Goddess of Night will draw aside the curtain of the starry vault, and night will be on. Now we notice some strange looking figures

standing out in silent solitude in the fading light, and they seem to be at some distance. What are those shadowy looking things over there? Truly indeed, it seems like an apparition that is before us! They seem to be ghosts that are coming out into the moonlight to walk and talk. Their ever changing attitudes caused by our movement give them a spectral hue. If the imagination is right and the moon in perspective, the shivers are not far away. . . . Now we will stop and make camp for the night close by.

Out on the Great American Desert far from the beaten paths of Man and a part of those vast arid spaces of our Great Southwest, there lives and thrives a tall and stately plant, known in the kingdom of Plants and Flowers as the Giant Cactus or Sahuaro; in the kingdom of Science as the *Cereus giganteus;* and to those among us who can pierce the vale of mysteries called by name the "Sage of the Desert." Tall and impressive they stand, these interesting and puzzling plants, silent and mute on the history they could tell of the life that passed through and by them in the long ago, romance of Indian boy and maiden on their way down from the cliffs beyond to the spring for water below, in that forgotten age; of wars won or lost, waged for the right to power by long forgotten races who have lived out their

earthly span and passed on. . . . They stand, a monument out there in the great alone. It might seem that God in His own way, for His own reason, placed Sahuaro out there in what looks to us the most unlikely place on earth to live and thrive, until the time when man should come to explore and poke around in the out-of-way places of this lonely land and get acquainted with old Sahuaro; only to learn the significance of faith and perseverance, good will and patience. Perhaps these are but monuments to His Genius. Truly can Sahuaro be called the "Sage of the Desert," for only out there does he live and die. . . . As we stand looking at each massive plant our minds can but wonder the why of it all: Why did Sahuaro come out to such a place to live? What is his genus and species? What of his heredity? Who is he, and what could he tell? Are these fantastic creations but ghosts of a bygone age returning to suggest to man the relics of a race long vanished? These plants are all so interesting that it is hard to pick out any one particular outstanding specimen, unless it be that very tall one over there. He is no doubt the old patriarch of this vast assemblage of old plant life. He is very close to fifty feet in height and his age is reckoned at no less than two hundred

and fifty years! What has taken place in all this parade of time during his generation?

Unique Growth

How wisely has Nature, the Engineer, put this plant together to withstand the rigors of drought and storm, to save during periods of plenteous rain for the years that are lean and dry. The physical structure of this remarkable plant, the oldest and noblest member of the Cactus Family, is truly a masterpiece! In order that the giant plant may withstand the violent windstorms that sweep across the Southwest during short rainy seasons, Nature has constructed for Sahuaro a strong cylindrical core of rods, like a network of fishing rods, extending the full height of the plant and cemented together with a succulent tissue both on the inside and the outside of the core; and these dozen or so rods, varying in diameter from one to two inches, support the giant growth from babyhood to old age, withstanding all attacks from angry elements or animal enemies alike. They constitute a considerable part of the Papago Indian's fuel and lumber supply, and are the fibro-vascular bundles of the botanist. Then over the thick, beautiful, pale green skin of our giant member in this fantastic clan is a thin white waxy coating, which in the

moonlight gives him a white translucent appearance that is most weird; he stands there with his upturned arms stretched toward heaven suggesting to us strongly the image of a candelabra, and with the blossoms and fruit on the ends of his arms one can imagine a lighted altar-piece in the bright moonlight!

These arms branch out from the great trunk about eight or ten feet above the ground, growing out of the stem nearly at right angles and candelabra-like near the base, then curving sharply and soon growing erect; several branches coming forth about the same distance from the ground in a more or less irregular whorl. At this point where whorl of branches and trunk intersect the latter has the greatest diameter, some three to four feet, for here the trunk is noticeably swollen or bulged, and its tissues are split open to permit the young shoots to burst forth into new life, in the bright, hot sunlight. Parallel ridges, or flutes as they are often called, extend the full length of the great stem, their furrows one or two inches deep depending upon the water content of the plant. And here it is that Nature, the great Engineer, displays the most remarkable ingenuity, combined with the greatest of simplicity and ease, (in her wisdom far surpassing Man's scope in engineering feat so little in com-

parison) : simply by means of these flutes during heavy rainfall periods, she gives Sahuaro the opportunity to take up and store large quantities of moisture, the fissures in their ridges widening and the furrows becoming relatively more shallow as the plant is water filled; and when the long, long periods of drought approach the furrows become deeper and the ridges closer, the plant gives up large amounts of water through transpiration, and thus Sahuaro bears a crop every year even without a drop of rain! Rain or no rain, these fantastic growths give forth their wealth of fruit and aureole of blossom at a time of long continued drought when we marvel that they are even alive! So has Nature, the Great Builder, with a simplicity and ease at which we may well stand amazed, overcome every obstacle of rigorous drought, hot sun, and severe storm with a nonchalant disregard of seeming superhuman difficulty, and with the simplest of structural devices! And not only does she thus preserve life among her *plant* children during the long travail of scanty rainfall or none, throughout generations for ages past during these periods of severe drought the Papago Indians have secured their fruit and drink from, and sometimes their very life and sustenance have depended upon our valiant Sahuaro—for ages standing

there in the hot sun making his brave fight for existence, and thereby extending a helping hand to his brother, the human, less able to withstand the rigors of drought and famine.

The Sahuaro is the largest tree growing on the American Desert; it is ranked as one of the most outstanding of all growths, and is truly one of the most remarkable plants on the globe! Sahuaro grows very slowly. At ten years of age he is but a baby four inches tall. When three feet in height he is more than thirty years of age, and still a baby cactus! and it is not until he has attained the age of a hundred years or more that he is a full grown plant, of forty to fifty feet, tall and dignified, his weight about five or six tons, we think. He begins to fruit when fifty or sixty years old and continues to bear regularly every year for as long as two hundred years! During this long period of fruit production, he does not require irrigation nor pruning, cultivation nor fertilization, nor any other care from the hand of man. More than this he is self planting.

Luscious Fruit

The fruit which is delicious, matures toward the middle of June. Each plant bears, after ten to fifteen feet tall, three to six fruits at a time and from fifty to three hundred and fifty in

Giant Cactus or Sahuaro

(CEREUS GIGANTEUS)

The Sage of the Desert, tall, stately, splendid, pillar-like, making his brave fight for existence during the long desert seasons of drought, bringing forth fruit without a drop of rain sometimes for three years at a stretch, and thereby extending a helping hand to his brother, the human, less able to withstand the rigors of drought and famine.

Photo by F. M. Campbell

SAHUARO OR GIANT CACTUS
(Cereus giganteus)

a season, this harvesting season lasting about a month from the middle of June to the middle of July. The fruit is a huge berry two inches or so in diameter and three or four inches long, oblong or inverted egg-shaped, sometimes a trifle narrower than an egg; it is of a lovely reddish purple hue streaked with bright yellow tracks, the pulp juicy and sweet, of a deep scarlet. As with oranges the thinner rinded berries are the sweetest and juiciest, the most luscious.

The United States Department of Agriculture is studying this delicious fruit as a possible article of commerce and a possible crop for utilization in the great desert areas of the Southwest. For the giant Sahuaro bring forth their fruit even after three years of extreme drought! and for centuries it has been used as dried food and preserves, as well as wine and fruit, among the Papagos and other Indian tribes of the arid Southwest.

Spines and Flowers

It is in the Giant Cactus that endurance records were made this year by boys in Yuma, Arizona, also near Los Angeles, and in several other cities of the Southwest; "tree-sitting contests" imitating the various refuelling and endurance flights of the air, and made most difficult due to the strong

pointed spikes projecting from trunk and limbs of old Sahuaro. The Sahuaro has two distinctive types of spines, those growing in sterile areoles from the giant trunk arming stem and branches with long straight rows of stout, sharp spikes, quite distinct from and larger and stronger than those of the flower areoles. They are often colored or mottled, with spreading radials of light gray and dull purple, darker toward the bases, symmetrical and undulating on the trunk ridges; in age becoming still darker, and fissured lengthwise. The fine white or whitish spines toward the tips of the trunks and branches and for the most part on the upper half of the giant stems, cause a white halo of light about the ends of the branches in the bright sunlight! Though very pronounced this is rarely alluded to in literature. The spines are quite translucent and resinous, and touch a match to one of them it burns like a lighted candle! This is true of all cactus thorns, (and in this respect cactus spines are similar to those of the Ocotillo or Candlewood Family). The hairs in the thorn clusters form felted cushion-like masses continuous throughout the areoles of these slender, sharp-tipped, and spreading or erect-ascending spines. Have you been in a Sahuaro forest and listened to the wind blowing through the spiny trunks with a "sighing"

noise like that of a pine forest? If you have not then you have missed something of the magic of the desert—a half of its weird fantastic lure!

As we pass on from the picture before us, we must not fail to take notice of the giant Sahuaro in blossom and bloom. Close attention will reveal some very interesting nature phenomena in this blossom time of May and June. The flowers of Sahuaro are of purest white, almost waxy in appearance and creating a fantastic halo of light around the tips of stems and branches, beautiful and most weird in the moonlight on the desert. These pure and lovely flowers are night lovers, they come forth while the rest of the world is slumbering, blooming only at night; and stay open on cool mornings until almost noon of the day following, but on bright hot days close about nine or ten o'clock of a morning. They are not quite so sensitive to light as the flowers of their sister cactus, the night blooming cereus. The buds form on the tips of the stem, singly, in the upper one-third of the areole of spines, and take shape as a bell or funnel form, the white petals recurving at night into a cornucopia effect, very pretty with the touch of purple-red along the tips of the sepals.

Over there near that creosote or greasewood is a graceful Sahuaro, a typical fellow, bearing large

white-petaled flowers two or three inches across and nearly twice as long; distinctive, though, in the beautiful blossoms running down the south side of his great trunk and branches for a short distance, as well as crowning his head with a becoming aureole of white.

Desert Habitats

Most of us have seen at some time or other a picture of Sahuaro, though we did not know his name. In the background is usually the low brush and vegetation of the desert. There he stands, splendid, pillar-like, in the solitude of "no-man's land" where he reigns supreme. Sometimes he is to be found a single column standing out on the mesas, alone, a Sentinel of the Desert! perhaps a relic of forgotten years? . . . And there he is a sanctuary where many kinds of animal life take refuge. In the great National Sahuaro Forest of over two thousand acres extending out nine or ten miles east of Phoenix, Arizona, woodpeckers and elf owls delight in building their nests and rearing their young in holes of the trunks made by the bold woodpecker, as many as twenty-five holes being found in a single Sahuaro, some of them estimated at over a hundred years standing. The plant soon recovers from such injuries in drought periods by a callous growth of corky

layer forming over the wounds and along the sides of the holes.

Out on the great Arizona Desert twenty-five miles southeast of Tucson is a magnificent Sahuaro forest miles in extent, where scarcely a hundred persons have set foot, in which these majestic and noble cacti hold full sway; growing in groups of three or four to a dozen trees, and so thickly for miles that a person can scarcely see out in any direction and where it would seem impossible to drive through with a car. We find them in the coarse gravelly soil of the foothills on the higher mountain levels as far up as forty-five hundred feet, and shunning always the lower levels and alluvial valley soils; for Nature has relegated these beautiful and fantastic specimens of plant life to the mountainous country of the hot desert, where their majestic presence ennobles and beautifies the vast arid wastes over which they bloom. Over yonder we see a most unique type, that of two giant Sahuaro standing so close together that they seem to be left all alone after the wedding of the winds. The desert space about them is clear, and they seem to be happy in the silent comfort of each other's presence—awaiting only the dictum "till death do us part." They have no upturned arms, just tall and stately

pillars of columnar evergreen trunk, defying time.

Then again we find another tall and dignified Giant, with only one short arm reaching out in some gesture as if beckoning the small son, close by, to hurry and grow. The little fellow might be fifty years old, a young and healthy baby. We might call this vivid picture "Aspiration."

Then we find Sahuaro growing along the rocky stretches up from the Gila River in Arizona, in southern California, Lower California, in Sonora, Mexico, and almost every mountain range of any size in southern Arizona has its forest of Sahuaro "constellations," large or small. In nearly all these desert habitats the Indians have camping places where they go into camp when the fruit begins to ripen, for to the Papago Indian the Giant Cactus has meant food and drink, and sometimes life itself for ages past; for doubtless the Sahuaro fruit has saved many Papago lives from starvation. So essential a part has the Sahuaro played in the life of the Papago Indian that he begins his New Year with the first fruit of the Sahuaro in June. In olden days festivity was occasioned around the old mud huts and tepees at the beginning of the Papago New Year when the Giant Cacti bloom, and even to this day wine is prepared from syrup made from

the Sahuaro fruit, and the fruit itself eaten, at this grand fiesta; after which dancing and singing continue for two days and two nights, followed by the drinking of delicious wine made from old Sahuaro. This feast is closely observed by the Papago, for to him it is the insurance for rain and good crops, the ceremonies also including loud and earnest prayer to the Great Spirit of Indian land for rain and favorable harvest.

Each June the Papago families go into community camps in the Sahuaro forests to gather and preserve the fruit. This work is done very deliberately, in keeping with the slow and stolid nature of the Indian. Two of the rods or "ribs" of a dead cactus are spliced together to make a pole long enough to reach the tips of the Giant Cacti, a hook is attached to the end, and a very slight push serves to knock off the ripe fruit, felling it to the ground. A morning's work is generally sufficient for the Papago, for the desert is blazing hot at this harvest season in June and for the most part they work very slowly, gathering not more than fifty pounds of the huge berries in half a day; after which the women prepare the juice and preserve the fruit. In making the wine the fruit is cooked to a syrup and strained, some water added to the fluid part and this ferments, soon afterwards being ready to store in large

earthen jars or ollas for future use, a portion set aside of course for the present occasion of the great New Year's feast. (Indeed this important fiesta is named "navaita" from the Papago word for wine, "navait.") Next, the women cook the strained pulp with the seeds for jam and preserves, and this too is stored in the useful olla which is sealed with adobe mud (and usually cleaned with it also), the sealing mud plastered down as tightly as possible. A considerable amount of the fresh fruit pulp with the seeds is also dried in vessels in the open sun, without further treatment, and kept indefinitely in the dry air and sun; then eaten by Papago children as a sweetmeat, or made into sweet seed cakes which are delicious. One of the writers saw as much as a hundred pounds of this in a Papago home served as a sweetmeat, and also as a cooked preserve taking the place of the white man's butter.

One can purchase at trading posts on the Papago Indian Reservation gallon or two gallon olla jars filled with Sahuaro preserves and with the tops sealed over with adobe mud, or sometimes with corn husks or leaves and then the mud, to preserve it from spoiling; and the fruit inside the jar will not be spoiled and is clean and wholesome. The jam has a brownish or reddish

brown color and is generally cooked down sufficiently to be rather thick. In preserving Sahuaro fruit the Papago Indians never have used sugar. The fruit itself contains a high percentage of sugar, and when cooked to a rather thick consistency and placed in the porous olla jars sealed over with mud, it keeps perfectly. The outside of the jars often appears very uninviting; some of the fruit juice oozes through the pores and collects sand and dust, and on this latter there is commonly a growth of blue mould, giving the surface a bluish gray or grayish appearance. It is much more difficult to buy the Sahuaro syrup at the trading posts than it is to buy the preserves, since there is an active demand among the Papagos for this syrup, even at a good price, and hence much more syrup and wine is made than preserves. Only the pulp of the berries is used for food and drink, the outer cores are thrown away. In some of these desert Sahuaro areas there are large heaps of old fruit cores of past seasons from which the pulpy fruit mass has been removed, and the cores discarded and thrown in large piles or heaps; somewhat like the kitchen middens we find for miles along the seashore, only here in the desert on a much smaller scale.

Many of the vessels in which the pulp is dried are taken from old Sahuaro, the thick corky

layers formed over the wounds made by the woodpeckers in his trunk often assume the form of such vessels and are then utilized by the Indian for his fruit or water containers. Truly the Giant Cactus has been a savior to his brother, the Indian. Is it any wonder that the Papago has named his New Year from old Sahuaro, to whom Nature with infinite foresight and wisdom has given such complexity of structure, habit, and environment?

Conclusion

Two hundred and fifty years ago was the year of 1680 and the years of our Pilgrim fathers. Arizona was unknown to any one except you, Giant Sahuaro. Perhaps you were old then as we know life. We do not know just how old you are but your skin is fair and not wrinkled with age; and since then you have seen the march of time from our thirteen colonies or states to the mighty nation we are today. Before you passed in review George Washington and his colonial troops; the Declaration of our Independence has gone into history; the great Lincoln is now a memory; the greatest war of modern times has been fought, and still you stand a living monument to the memory of all these things. Gracefully and majestically you wave time on

by. . . . In the desert there is a lesson for each and every man. We stand here in this vast amphitheater of the sun, and find you with outstretched arms and head upturned toward heaven as if in the attitude of prayer. There you will stand year after year, Giant Sahuaro, long after we and our kind have passed on, as if in silent atonement for some deed of a long forgotten past.

Have you slept in a tent alone—a tent
Out under the desert sky—
Where a thousand thousand desert miles
All silent round you lie?
And the dust of the æons of ages dead,
And the peoples that tramped by.
If you have, then you know, for you've
felt its spell,
The lure of the desert land.
If you have not, then I could not tell,
For you could not understand.

Madge Morris—Lure of the Desert.

Desert Flowers*

Introduction

WHAT are those wonderful, mysterious plants one meets as one travels along the highway of the desert, casting their weird shadows against the night sky? Perhaps they are but ghosts of a bygone age, lingering to impress upon Man the suggestion of some race long vanished? No, they represent Nature's handiwork in the realm of plants, each one distinctive of symmetrical, lace-work, cross-patch or sculptural designs. Perhaps when Nature planned her scheme of plants and flowers, looking upon the job she decided that she could do even better; so these beautiful, weird, fantastic shapes we see silhouetted against the sky line and which we call Cacti, represent Nature's best handiwork in her realm of plants and flowers.

It is most interesting to stop and examine these beautiful specimens. No two are alike, apparently, for here and there we can see general outline changes; but upon closer scrutiny we find them beautifully alike. Every year thousands of tourists motor through that far southwestern country

*Published in the *Ladies Home Journal* in April, 1930.

—western Texas, New Mexico, and Arizona—to the Coast. Even in their hurry across the desert they see vast stretches of chollas (pronounced "choyas") or cane-cacti, prickly pear or nopaleas, bisnaga or fishhook cacti, hedgehog cacti, and last and largest, Sahuaro, in their desert homes. Naturally, they take specimens of the smallest of these most curious of Nature's plant creations—the devil's pincushion, rainbow cacti, sunset cacti, the night blooming cereus and others—so common in the sunny Southwest. In nearly all lands, in Europe more so than in America, "baby cacti" and the rarer smaller varieties such as dainty pincushion cacti, gorgeous rainbow cacti, the purple-spined cactus, and the old man cactus whose spines Nature has transformed into flowing white "hair," are extremely popular for window gardens. In mild climates out-of-door cactus gardens are among the things most prized by the amateur or "gentleman gardener" who is looking for something new and something different.

Eminent botanists from Germany, Holland, England and far-away Japan, Australia, and Palestine have travelled to Arizona to study the Sahuaro or Giant Cactus, one of half a dozen world-famous plants, and the equally interesting pitahaya, or organ-pipe cactus, which at a dis-

tance resembles nothing so much as a pipe organ set up in barren foothills.

Unique Types

Cacti are among the most unique as well as the most popular group of plants of the day, and the species known to botanists as the Cactaceæ are true to type. The name refers to their very characteristic and almost ever-present spiny covering. But so well fixed in the popular mind is the name that many plants of the desert, quite unrelated, are spoken of as "cacti." Thus the ocotillo, or candle flower, because of its leafless, spine-clad stems, often fifteen feet high, is invariably pointed out as a cactus. To be sure, one of its several names is coachwhip cactus, though the name cannot be accepted as *prima facie* evidence of its relationship to cacti. Another name is Jacob's staff; however, it is contended that Jacob never would have used the ocotillo for a staff without first having removed the spines.

Agaves, or century plants, the mescal, or maguey, of the native peoples and Mexicans, also are called cacti, since, except when they blossom, which is but once in their lifetime, they consist of a mass of thick, evergreen, spine-tipped leaves. In reality agaves are members of the Amaryllis family and hence are near-lilies. They

have struggled with Nature for an existence, have been baptised with the spirit of the desert, and they, too, have become cactus-like. Christ's-crown or allthorn, desert buckthorn, graythorn, junco, and other spiny, leafless shrubs are commonly,though incorrectly, referred to as cacti.

Botanists generally agree that the cacti are related, though distantly, to an insignificant group of plants known as the Loasa family. These are herbs with rough leaves and stems, and flowers that open toward evening, with inferior ovaries and many petals and stamens. There are no intermediate plant groups which connect present-day cacti closely with any group of plants, a statement which should please alike anti-evolutionists and fundamentalists. Cacti are, therefore, quite distinct in their peculiar manner of growth, their structure, and their unique development of spines.

Nature's Distribution

Cacti are indigenous to the Western Hemisphere and are most abundant in parts of South America, Central America, Mexico, and southwestern United States. There is a scattering of them throughout our country and one species grows as far north as Canada. About two hundred and fifty kinds are native in the United

States, and of these one hundred grow in Arizona, the premier cactus state. All told there are perhaps a thousand species of cacti. This fantastic clan is common in parts of southern Italy, the Sahara Desert, and in Palestine, also on the continent of Australia where literally they have "taken parts of the country"; but all these latter species are introduced forms from the Western Hemisphere.

Careful study leads to the observation that the more spiny cacti grow in the most arid and forbidding situations on the desert, with intense sunlight and temperatures as high as 130 degrees Fahrenheit—a veritable inferno. Here their dense covering or blanket of spines acts as a lattice work, the first ever devised for the protection of plants; cutting off as much as twenty per cent of the light, lowering the temperature and raising the humidity within the layer of spines, thus reducing the evaporation from the plant. With their spines removed cactus plants would be scalded with the intense heat and light of a single summer day on the desert!

Spine Types

The spines of cacti are often beautifully colored or mottled with white, ivory, yellow, brown, red or near-black, sometimes are cross-

ridged or sculptured, and in the different groups they vary much in form, size and arrangement. Unlike the spines of other plants, cactus spines grow from their bases, and when young these are soft and flexible even when the tips are hard and sharp. As the specialist would say, cactus spines are "retrorsely barbed"—that is, they are armed with small barbs, so that they enter into one's flesh easily but are pulled out with difficulty. Extraction causes pain, some laceration, and otherwise much discomfiture as we can personally testify.

No botanist has explained satisfactorily the origin, development or the inordinate multiplication of cactus spines. Doubtless they did not develop wholly, as is popularly supposed, to protect the plants against animals, though for this purpose they are very efficient, and without them these juicy, succulent plants would long ago have become extinct through the ravages of rodents like rabbits, rats and squirrels.

Chollas are unlike others of the cactus family and are the most spiny, their spines being covered with sheaths; but this does not lessen their effectiveness, for sheathed cholla spines are not peace emblems. Each cholla is a miniature fortress on the desert, fighting for its right to exist. It is a sanctuary where many kinds of animal life take

Photo by J. G. Brown

JUMPING CHOLLA (Opuntia fulgida)

refuge. The cactus wren builds its nest and rears its young and the greater part of its life is spent in the chollas, where it is immune to spines and spicules and there is no danger of attack from the outside. The chuckwalla, a kind of desert lizard, also spends part of its life among cacti, chiefly the chollas, and invariably seeks them when being pursued. Again, the elf owl, the smallest of the owl family, builds its nests high up in the holes left by woodpeckers in the trunks of Sahuaro. It is immune to attacks of every kind, for no animal can climb a Sahuaro. It is the law of the desert: plants must defend themselves against animals and the elements, while animals contend with animals.

In the evolution of cacti the tendency has been away from the development of leaves and, disregarding the first two seed leaves, most cacti are leafless. A few of the primitive ones have large persistent leaves similar to those of other plants.

Still others, like chollas and prickly pear have small leaves that fall off soon. Like other plants cacti require food for growth, and this must be made by the plant. In the absence of green leaves which ordinary plants use for this purpose, the cactus manufactures its food with the green coloring matter in its stems.

Ocotillo are among the oddest of southwestern

plants and grow along with cacti. In the Spring their masses of flame-colored flowers resembling lighted candles glow from the tips of long stiff stems. Truly the desert is lighted up when the ocotillos bloom! Their bright green leaves are put out two or three days after a heavy shower and disappear as quickly with the first approach of drought. Botanists puzzled long over the classification of the ocotillo and finally gave it a family all to itself. Like cacti, ocotillo have only distant relatives—namely, the tamarisks.

Mamillaria, or pincushion cacti as they are known, are the smallest of the cactus family, being at best one to three inches in diameter and only a few inches tall. They have slender spines which are in clusters and with a radial arrangement, and which in turn are spirally disposed on small mounds, hence the name Mamillaria. The flowers are small, of yellow, orange, pink, lavender and rose-purple colors. They are very beautiful and symmetrical, and are much in demand.

Another small cactus, known as the hedgehog, grows from a few to fifteen inches tall, usually having several stems two to three inches in thickness from one root, and with spines, moderately slender, not over two inches long; they are commonly wide-spreading. The flowers are about three inches across, and are among the more

showy of the cactus family. Colors range from deep rose, rose-purple, deep purple to deep crimson. Another kind growing in the mountains of central Arizona forms dense mats, with crimson-red or cardinal flowers. Then there is the rainbow cactus, with its single, erect, short stem, radial spines lying close to the plant, and of many colors—yellow, orange, pink or red—in cross bands. The flowers are pink with lighter centers.

Cactus Fruits

The fruit of the hedgehog is spiny and one to two inches long. When the fruit ripens the spines fall off, leaving smooth, oval, amber or red, juicy berries. They are slightly acid but delicious when served with cream. One kind in southern Arizona has earned the name "strawberry cactus," and perhaps in time in the Southwest we shall gather "strawberries" from cacti.

Prickly pears branch from near the base and grow a few inches to several feet tall. They are easily recognized by the flattened joints, which are circular, oval or elliptical and from three to eighteen inches long. The joints are true stems, and if detached and planted in any position, even upside down, or if laid on moist ground, will develop roots and grow into plants. A kind in southern Arizona has circular, light purplish

PRICKLY PEAR (Opuntia chlorotica)

joints, with few spines but many spicules, and beautiful light yellow flowers.

The flowers of prickly pears are two to four inches across, quite double, and mostly bright or orange yellow with reddish centers. They remain full open for but one day, and in some varieties change in a few hours from yellow to orange-red. Some prickly pears have beautiful light rose or rose-purple flowers.

Giant Cacti

Bisnaga, barrel cacti or fishhook cacti, grow mostly with a single stem one to five feet tall and six to fifteen inches in diameter, though a few kinds have several stems from the base. Bisnaga are sometimes called compass cacti, since they invariably lean toward the southwest. Travellers lost on the desert have saved their lives by cutting off the top of the plant, beating the fleshy part of the stem into a pulp, and squeezing the water from this.

The flowers are borne in a crown at the top of the stem and are about two inches long, and yellow or deep orange-red. The fruit of a variety in Mexico are filled with acid, which with sugar and water makes a drink resembling limeade. The well-known cactus candy is made from the bisnaga.

The Sahuaro, as already noted, is the largest and noblest of the cacti, and lives to an age of two hundred and fifty years, grows fifty feet tall, and towers majestically with raised, candelabra-like arms above all other desert plants. Its trunk and branches are fluted and armed with stout spines set in long, straight rows. A group of Sahuaro on the desert or in the foothills, by day surrounded with halos from their glistening spines, in the silent night projecting a marvellous silhouette, is a picture never to be forgotten. The flowers open in the evening and the petals become recurved, giving the effect of a cornucopia, and close by nine o'clock in the morning, thus proving the desert loves night bloomers.

Who has not heard of or seen at some time in his life a beautiful night blooming cereus, which as its name implies, blooms only at night. In early California days festivity was occasioned around the old *haciendas* when one of these beautiful plants was about to bloom. Nature has rarely produced a more beautiful flower than the night blooming cereus with its large, fleshy, beet-like roots and slender stems about three-quarters of an inch in diameter, with its blossoms of the finest and largest among our native flowers, funnel-shaped, from seven to ten inches long and four to five inches across. They have a delicate

fragrance, with gracefully recurved petals, beautifully white tinged with tan, and with long, yellowish translucent corona-formed stamens. The fruit of this plant is bright red, about four inches long, quite egg-shaped, and ripens in the Fall.

Soldiers of the Desert

Introduction

IN that long long ago when God made the Earth and the seas thereon in six days or cycles of Time, and this little planet of ours came into being from out the midst of Infinite Creation, there seemed left here in the great arid spaces of the World a huge pile of rock and sand and mud and earth; thereafter, the Great Sculptor in His vast Studio of Nature has been at work, creating flowers and plants of the rarest hues and designs for man to hunt, find, and see—and perhaps to read in the hidden language, therein, of all these things most beautiful: Love, away out here on the desert.

Have you ever been introduced to the Yucca of the Arizona and California desert? We are sure that most of you have not. Then come with us for a little visit to the great Desert of the Southwest and we will show you some of Nature's rarest flowers and plants.

We are lucky indeed, for we have selected an evening or rather started in late afternoon for a spot near Phoenix, Arizona, which is unlike any

other in the world, for this spot is a gorgeous flower-garden of desert plants and shrubs! Here they grow in a setting of color and arrangement that runs riot with the imagination, and really to see them makes one exclaim, "Oh, what a wonderful picture." . . . The locale is Superstition Mountains, and the floor of the desert round about is covered with color and design, filigree and shadow, spectral and ghost-like. Nature, the Painter and Sculptor, has decorated the sky high overhead of the ghostly old mountains so aptly called Superstition, with a cloud formation of Strato-Cumulus, or Cumulo-Nimbus: gorgeous banks of huge cloud-masses all chiseled out in bold relief, while over there the base is of a threatening dark mantle. Perhaps there is a storm in the offing, but not for here. Up into all this old Superstition pokes his many black sombre heads, and in the foreground in front of him we find the desert in full bloom, and the desert floor is all aflame with color! . . . In the view before us we notice a great many kinds of desert vegetation, plant life, shrubs of all sorts, blossoms in every hue. The growth is from two to twenty feet or a little more in height; excepting here and there we find the Giant Cactus, or mighty Sahuaro, towering far above all this other plant life. We might even stretch our imaginations a

Photo by F. M. Campbell

YUCCA OR PALMEA (Yucca elata)

Standing at attention in platoons. as if the officer of the day has but just passed by — - Soldiers of the Desert on Dress Parade.

little and assume that we are looking at some ancient scene, away back in that Age when the giant Dinosaur with the sixty-five-foot body, erect on two huge hind legs, gently browsed in the tops of trees and shrubs, getting his enormous meal. Now and then he would stop to look for the enemy, then go on peacefully about his dinner. Like this ancient reptile these giant Sahuaro, here and there, stand out in bold relief over and above the rest of the desert life. Their huge dark-skinned bodies or trunks with the myriads of spines and thorns make them to be feared by man and beast alike.

And now it would seem that the Divine command had just been given, for there over the foothills and along the bahadas or mountain slopes are hundreds of soldiers standing at attention! For the Yucca, atop with their new headdresses of fresh blossoms in Spring array, are covering the mountain sides far and wide: tall and straight as soldiers they stand, each in his appointed place, soldiers of the Desert on dress parade! In every instance "eyes are front" and waiting for the stroke of Time. Two months—and the beautiful petals shall fade and fall, and the tall straight stems will die and turn to the ashen gray of the desert.

Ingenious Growth

The physical and structural designs of the Yucca are quite complicated in the extreme. To live as the Yucca has to, out in the hot aridity of the desert far from the necessaries of plant existence is a story which seems like hardship; but in reality it is just as easy for the Yucca in his chosen home-place as it is for the morning glory or the delicate tea rose in theirs, perhaps more so. . . . And why? The answer is to be found in the marvellous structure Nature in all her wondrous Wisdom and marvel of design, creates for these, her Soldiers of the Desert. The *Yucca elata* stem, six to fifteen feet tall and occasionally growing as high as twenty or twenty four feet, a single stem from the base or several stems growing from a common base and forming a large clump, consists of a dense fibrous core three and a half to four and a half inches in diameter, the outer part a rather compact, hardened fibrous cylinder, an eighth to a quarter inch thick, composed of strong closely set fibers. And it is in these hardy stems that Nature, the marvellous Engineer, stores the precious water needful for the long arid seasons of the desert; and when the hot dry winds sweep across the bahadas and down the mountain canyons, or the stormy rainy seasons approach, this stout fibrous cylinder of the Yucca

stem valiantly withstands the violence of wind and cyclone, rain and storm.

Our Yucca soldiers are dressed in uniforms of vivid green leaves covering stem and branches, which as the years pass still cling to the old soldiers as spine-tipped sheaths almost impenetrable to an enemy, and made up of the dead leaves of many seasons past. Also, rather widely scattered along the stems and around their bases are several firm awl-shaped bracts with thick leathery spine tips, the sharp spears of our Desert Soldiers. Beware of coming too close to a Yucca, or of plucking a beautiful flower too rashly! These soldiers defend their lovely blossoms, their magnificent helmets of flowering bloom!

Let us assume that it is early in May in the Spring of the year, and that we are motoring down a certain road along the California-Arizona frontier in late afternoon, when the sun's long shadows spell the end of the hot desert day, and we suddenly notice countless numbers of tall stems all abloom with huge clusters of yellowish ivory colored flowers that seem to have come suddenly out of nowhere! If we but knew it there are from fifteen hundred to two thousand blossoms in each cluster of panicle-like inflorescence! Just think of a bouquet of such size. The coloring is exquisitely beautiful, and from a few feet

distant the magnificent blooms seem to be carved out of pure wax! The large cream-white petals of the *Yucca elata,* two and a half to three inches long, are tinged with green and gently merge into the light green tints of the flower stem; while the flowers of our California variety, *Yucca whipplei,* one of the most beautiful of all Yucca, are of a lovely golden hue, glowing in the bright sunlight like lighted candles before the altar, and known as "Our Lord's Candle." A host of golden Yucca! Truly they flash upon that "inward eye" and bring to those who have had the privilege of beholding them the untold bliss of solitude. For a forest of Yucca extending for miles in every direction, over bench-land, rocky knolls, and close to the bahadas or mountain slopes, such as one can see in southern Arizona, southern New Mexico, or western Texas in the Spring, brings a feeling of awe and inspiration never to be forgotten.

It is difficult to describe one's feelings upon seeing an army of Yucca for the first time. In Arizona and New Mexico the natives call one variety of our desert soldiers the Spanish Bayonets! They are the fleshy fruited Yucca, their fruit when ripe resemble somewhat a banana in size and shape and are a delectable morsel, in taste and texture, too, almost identical with our

banana, and much used by Mexican and Indian as a breakfast or supper dish.

Habitats and Peculiar Uses

When the shadows of the hot desert day are just right and the blue of the hills is settling in the background, we who are travelling along the Arizona-California frontier shall find a picture that is inspiring; beautiful to contemplate; hard to conceive otherwise than out here on the stilly desert, away from the commoner things of life to which we are so used. Our Soldiers of the Desert delight to take possession of the bahadas, the mountain canyons, especially the lower table lands and mesas, sometimes climbing up to an altitude of five thousand feet, then again covering the foothills in one vast forest of solid ivory, or mustering an army of golden armor as far as eye can see; occasionally we find a solitary sentinel high up on the mountain top, his golden helmet gleaming in the bright sun of noon in southern California, perhaps on the road to Lake Arrowhead and Big Bear, or in clumps of twos and threes or more, dotting the landscape with their green spears and full dress, in gay Spring array of purest wax or ivory. From southern California through southern Arizona, on down to New Mexico and western Texas is the largest

Yucca area in the United States, having an almost continuous growth of these tall straight soldier-flowers, the Yucca of the Desert.

The roots of the Yucca, thick and soft fibrous, penetrate deep into the soil; they are much used by Indians and Mexicans, also by some whites, as a substitute for soap. When used with water they produce a lather that is very cleansing; they are highly recommended as a preparation in washing the hair, for which use these roots are said to be unexcelled. It is well known that the native peoples have notably heavy growths of hair, and this is thought to be due in some measure to the use of Yucca roots in the place of soap for washing the hair, as well as to the outdoor life they live. At any rate both Indians and Mexicans use Yucca roots to such an extent as to denude great areas of the Yucca plants. This is particularly true in the vicinity of Indian camps or Mexican villages. . . . These peoples also gather the long stout fibers from near the bases of the leaves, comb them out carefully, and weave or plait them into ropes or straps which are very strong and durable. It is easily possible for a Mexican or an Indian to make a rope fifty feet long and three-fourths of an inch in diameter from the fibers of Yucca, such a rope will be very lasting and almost never wear out. Paper, also,

has been manufactured from stem and leaves of the useful Yucca; and during spells of continued drought stockmen cut down the stems of Yucca and chop them fine with a mechanical stem or stalk cutter, or even with a silage cutter, then feed the shredded and cut portions to their hungry cattle and sheep. For the stems contain a considerable amount of grape sugar which has a food value for stock.

The Joshua or Tree Yucca

What are those grotesque shapes one glimpses in the distance as the shades of Night begin to darken the desert, and then as the minutes pass a full moon rises over a sleeping world? Weird, fantastic figures appear, ghostly in the white light, and they seem to approach the traveller as he speeds along, with their misshapen bodies, and outstretched arms with grasping fingers pointing at him like some evil Messenger of the Night. It is as if a great cemetery had suddenly given up its ghoulish forms and they were now standing at attention in ghost-like communion! Repulsive, yet magnetic, they inspire one with a sudden, fearful awe! until remembering his botany he realizes that these austere and grotesque apparitions are but trees of the desert, the largest of all the Yucca, our Tree Yucca. Ghost-like specimens

of Nature we now know them to be in the bright moonlight, by day they are still fantastic shapes, curious freaks of Nature, but not quite so fearful and awe-inspiring. Twenty to forty feet tall, a foot and a half to three feet through, their stiff stout branches forking continuously at the flower terminals tend to create this fantastic appearance of the plant, while the bluish green leaves, half a foot to ten inches long, are armed with minute teeth. There are greenish white flowers one to two inches long, and fruit which ripens in May and June, two to four inches in length; not edible but possessing a soapy unpalatable taste, while the seeds are gathered and eaten by the Indians. The wood and the bark is cut by natives into thin layers, and used as wrapping material, or manufactured into boxes and similar articles. . . . There is a great forest of Joshua Trees out on the Mojave Desert about eighty-five miles from Los Angeles, near Victorville, California, and many smaller Joshua Forests are to be found scattered over central Arizona and southern Utah. It is a peculiar fact, but nevertheless true, that in the forests of flower Yucca not a single Joshua Tree is to be seen; a few miles down the road we may find a Joshua forest, and not a single flower Yucca will be growing there.

Surrounding the Joshua Tree is an atmosphere

Joshua Tree or Tree Yucca

(YUCCA BREVIFOLIA)

Not every traveller knows that Joshua, seeking the Holy Land, travel wearied, tired after a long dusty trek, looked forth to high Heaven for a sign which would tell him the right road to take. Guidance came instantly. "Thou shalt follow the way pointed for Thee by the Trees. And Thou shalt enter in." Be it noted that the Joshua Tree points its branches usually in one direction, its spears appearing almost like arrows poised for flight. (One of the versions from which the name Joshua Tree has sprung.)

JOSHUA TREE OR TREE YUCCA
(Yucca brevifolia)

of romance and mythology which is most interesting to the layman. It is said that when Joshua was travelling in the Holy Land, and seeking the Holy City, he came to a place where several roads converged, and becoming confused, did not know which road to take. He noticed, however, that there were several clusters of peculiar trees, most fantastic growths, along the roadside, and that their outstretched arms all pointed in the same direction, and following this indication he reached the Holy City in good time; then being a devout man, he gave thanks to God for this Divine Guidance and Protection. So the Joshua Tree, the *Yucca brevifolia* in the land of science, received its historical name. . . . And now we who have travelled the entire afternoon along the hot Arizona-California highway must take our leave of soldier-Yucca and Tree-Yucca alike, for the shadows are beginning to lengthen and the purple haze is rising over yon mountain peaks, beyond the California frontier. The Sun is drawing to a close his triumphant journey across the western sky, ready to "go down" in a flame of Glory! We give one farewell glance toward our flower Soldiers of the Desert, blending their shining armor with the golden glow of the evening hour in a flash of brilliant color! and—it is Sunset on the Desert.

The Desert-Tree

Introduction

IN the beginning of Time when the Master Mind looked down upon this little planet, His creation out of the vastness of Eternity, of all things most beautiful which he gave to be planted in the great arid spaces of the Earth there came forth: a Tree. A wonderful, weird, fantastic growth it was, and grew and grew upon the Desert until one day Man came along and looked upon this most exquisite creation of the Great Lord God, and finding it a green and lovely thing he called it thereafter, the "Palo Verde." . . . Are there those among us who have spoken of the vast arid parts of the Southwest, our Desert Land of Plants and Flowers, as the land God forgot? If so, they surely have not looked upon the riot of contrasting color in the desert at sunrise and at the beautiful sunset hour, when the skies are flooded with glory and the mountains stand forth in majestic splendor; nor viewed the moonlit beauty of the Desert from afar when that exquisitely beautiful flower goddess, the queenly Night Blooming Cereus, sheds her soft fragrance on the air, perfuming the atmosphere

for miles around in the cities and far out on the desert mesas; nor seen the scarlet Ocotillo blossom in fiery splendor, nor the vivid coloring of the Palo Verde when in bloom; for who would dream of calling a realm of such living beauty forgotten? Truly it seems as though the "Unseen Artist" had been at work and had transformed the face of the Desert into a great flower-garden, in which only the rarest and finest of Nature's flowers live and bloom. They are such flowers as are seldom to be seen anywhere else, and their delicate colorings, odd shapes and peculiar aroma quickly attract attention.

So the great Arizona Desert has come to be, and it is filled with wonderful mountain ranges and streams of water that sink into the sands and disappear as if by magic. There Nature, the Great Builder, has caused rare and beautiful flowers to come forth and blossom, and give beauty to the surrounding scenes in the wonderful warm sunshine. They are of weird shapes, fantastic designs of leaf and flower, colorful in every manner of combination; delicate and rare in this coloring. . . . In such a setting as this the Palo Verde makes his home.

Among the most hardy as well as one of the most magnificent of desert growths is the Palo

Verde, Parkinsonia and Cercidium, in the realm of science. The early Spanish explorers found the tree in former days of discovery and named it the "Green Stick" or Palo Verde in Spanish, on account of the vivid coloring of green throughout branches, branchlets and bark of stem and twigs.

Peculiar Growth and Structure

No architect among men ever created a building or structure that has so many engineering features necessary for strain or stamina, as the structural designs which form many of our desert plants and shrubs. The Infinite Mind of Nature has given them resources by which they must take care of themselves, and how well they do it! and this they have to do, for theirs is the environment in which Nature demands the hardy life in both plant and human kind. . . . The Palo Verde, a peculiarly American growth, is a sturdy type of tree, sometimes twice as broad as it is tall, the trunk varying from six inches to three feet in diameter and growing one to four feet in height; frequently we run across a "tree" with a short stout trunk only a few inches high! The branching and growth of the foothills tree is diffuse and stiff, not graceful, but picturesque and suggestive of the desert, as many as thirty arms in

erect-ascending positions branch off from the base, irregularly and crookedly, giving a fantastic vase-like appearance to the trees in the greenish yellow haze they create over the foothills and gravelly mesa slopes, when the growth is abundant. This vase part is always broader at the top, the secondary branches being stiff and never very thick, so that the trees throughout have a spreading broom-like appearance, intricate in design but not dense, and beautifully symmetrical and rounded, of a deep living green throughout the bark of twigs, trunk, and branches. A large part of their transpiration and the manufacture of their food takes place in this green bark of stem and twigs. And, (with what Infinite Wisdom has Nature, the Great Architect, taught her Plant children) during periods of prolonged drought they often do not put forth any leaves for as long as a year or more at a time; and thus the Palo Verde will live for eighteen months and sometimes for two years with little or no rain! During this time of travail when no leaves put out, the trees make no growth and will not blossom more than once—less hardy than that huge fantastic growth, the Giant Cactus, which can live for three years or longer without a drop of rain, and blossom and fruit most beautifully during all this time of long continued drought!

THE DESERT-TREE

Have you ever heard of the Blue Palo Verde, the *Cercidium torreyanum?* Well, I don't suppose that you have, and we are going to try and tell you something about one of the most beautiful of plants that grow and blossom on the desert. Description belies it; one must see to appreciate, for the wonderful coloring in the haze of a late afternoon beggars description! The Blue Palo Verde is one of the most beautiful of desert trees and one of the most characteristic plants of the desert. Its bluish green coloring is easily seen and recognized in the distance, and in the sandy washes or arroyos of the desert the growth often has a blue misty appearance, particularly toward evening. (It is from the blue haze which characterizes this variety of the tree that the scientist writing named it the "Blue Palo Verde.") With their blue-green twigs and branches they are blue in winter or during prolonged droughts when the leaves are not put out, and during such droughts they blossom even when the rainfall has been very limited, though they bloom more profusely with abundant rainfall. Usually the blossoms appear before the leaves come forth in spring, so that the tree is characterized by the leafless blue-green twigs bearing masses of bright yellow flowers, and as the flowers begin to disappear the leaves are put out. The tree is also individualized

by its beautiful broadly rounded head often more or less irregular the branches extending out farther on one side than on the other and the twigs rather short and stiff and spinescent the wood is soft white and of poor quality. The growth of this blue variety is slow and on the desert it is long lived but when growth is forced with cultivation and where there is poor drainage in the soil it makes a beautiful growth for a few years and is very attractive then later like the Mexican Palo Verde becomes diseased with a witches broom and is short lived.

Like the Ocotillo the shining green twigs of the Mexican Palo Verde bear two kinds of leaves those that appear first on the young growing stems and from which spines develop and then the regular leaves which appear later on the same stems growing from buds in the axils of the thorns both are green and a foot or a foot and a half long. It is the short stout petiole and rachis of the former type of leaf which thicken and harden and then develop into strong central spines changing from the soft yellowish green tissue within a few days time to hard polished sharp-tipped brownish yellow thorns the tips dangerously recurved and sharp-pointed. The leaves of the Foothills Palo Verde the *Parkinsonia microphylla* are very small and give little

character to the tree either in color, shade or density; indeed during the winter and early Spring season when the tree is entirely without foliage it does not change in color or appearance, and in the distance appears the same lovely apple-green or yellow green mass of beauty, with or without foliage. Unlike most trees that have large leaves which give a distinct line of demarkation to the outline of the tree, Palo Verde have no distinct line of demarkation for outline, the leaves being small or absent, and their twigs or branchlets gradually terminate in slender tips or points. They appear, therefore, more or less hazy or indefinite in the distance on the desert, and in outline seem to merge into the surrounding space, somewhat similar to a Corot painting of a tree.

In the blue haze and descending shadows of the long desert day, one will notice a very peculiar hazy or smoky effect which seems to melt into the sides of the mountains. The brilliance of this mist seems to be brighter and sharper as the shadows lengthen, as if a halo of light were about the shrub-like trees in the distance. This, then, is the beautiful aspect of the Blue Palo Verde when in full bloom. For the tree when in flower is a very wonderful sight. The flowers are of a vivid yellow and are almost too bright to behold in the clear strong sunlight; one can

scarcely look at the trees without experiencing a dazzling sensation, and the feeling of exquisite delight which comes from beholding sheer beauty of form and color: the blue-green background of stem and twigs and the brilliant yellow more or less diffused or tinged with the orange-red of the banner petals of the flowers. These last are the fifth petals, larger than the others, and they stand rather erect and slightly forward, while the other petals, a half inch or so in length, are spread out in the shape of a saucer, radiating from the center. The flowers, an inch or more across, are borne on buds mostly of last year's development, appearing in April and May, rarely in March, and nearly all open at one time and last but for a few days, or at most two weeks. So the trees make up for this short period of blossoming by their great wealth of exquisite satiny bloom and dazzling color! but one example of Nature's way of balancing the variations of Life in the eternal scheme of things entire.

The Mexican Palo Verde is handsome at all seasons with his broad rounded head, only moderately dense, remaining green all through the winter, and his more or less pendulous branches extending outward and upward thirty and sometimes forty feet above the ground, and *sixty* feet in breadth! This tree, too, is one of Nature's

rarest sights when in flower, the crinkled lustrous mass of living yellow and red bloom diffusing a shining halo of light throughout the bright green of stem and branches, a wealth of beauty in blossom which Nature bestows with lavish abundance upon Mankind dwelling on the desert, for weeks at a time. So characteristic are the beautiful trees on the Arizona University Campus that their season of blossom time is looked forward to by all, and called by the students "When the Palo Verde bloom."

The Foothills trees bear an enormous number of flowers during their season from late April until the first of June, and during this time they give the foothills and mesa slopes a characteristic cream color for miles in extent, which is enhanced by occasional Blue Palo Verde bearing masses of bright yellow flowers, and punctuated by scattering Sahuaro stems or Giant Cactus trunks. This is the most beautiful time in the Spring, for not only are the Palo Verde in bloom but brittle bush, a low shrub with gray-white leaves and masses of bright yellow flowers, is abundant; and many of the cacti with their purple flowers are in full blossom in particular the strawberry cacti, the prickly pear with large yellow flowers suffused at their bases with red or reddish brown, and the chollas with flowers of almost every color

or shade imaginable! Then is it truly Springtime on the Desert.

Habitats and Desert Peculiarities

Out on the great Arizona Desert, in lonely solitude, the beautiful Palo Verde live and thrive; they seem to love it for it is apart from the world of things which we know in our cities, towns and villages. Here they live and breathe the pure desert air and sunshine; here their roots go deeply into the sandy soil, or travel great distances along the sub-surface for the precious water they must have. Along the foothills and bahadas or mesa-like mountain slopes, among rocks, or high up along the four thousand foot level, from southern Arizona to the southern part of California, to Sonora, Mexico, and Lower California, the Foothills Palo Verde give to the mountain slopes a misty, hazy, light green or yellow-green color, extending as far as eye can see; and nearly always interspersed here and there with giant members of that fantastic clan, the Cacti of the desert. Lower down in the pure sands of arroyos, on sandhills and in low canyons, only occasionally in the gravelly foothills, the beautiful Blue Palo Verde rears her wealth of golden blossom in the Spring and the lovely masses of blue-green twigs and leaves on her beautifully rounded head.

While it is in the moist soil along the Rio Grande in Texas, and the lower Colorado in Mexico and extreme southern Arizona, that we find Bagote or the Mexican Palo Verde, *Parkinsonia aculeata.* There are only a few kinds of Palo Verde known to botanists, these three in the Great American Desert, our Southwest, and adjacent Mexico, Parkinsonia and Cercidium; one or more farther south and east in Mexico and South America, and one in far away South Africa, a species somewhat similar to his brother Parkinsonia, the Mexican Palo Verde.

The long pointed green pods of all varieties of our beautiful desert tree are much used by the Pima and Papago Indians and also by Mexicans as an article of food. The valves or walls of the pods are thick and leathery, so that the young seeds or beans are shelled out and when very young cooked directly (without further treatment) either in water, or in meat broth made from fresh or dried meat, and called by the natives "jerke." When half grown the walls of the seed become tough and thick, and in this case the seed covering is broken at one end and the embryo plantlet with its thick, yellowish gelatinous layer is easily forced out. This process is very rapid, one can gather a mess of these in a short time, and they are delicious eaten raw as a salad

or roasted in the oven, when they constitute a delectable dish. Removing the thick skins from the immature seeds is done by Indian women biting the ends of the seeds off with their teeth, and squeezing out the dainty morsels of food from the thick skins with the two fingers. One of the writers is very fond of eating the half-grown seeds of Palo Verde, shelling them out of the green pods, then with the teeth nipping off the ends of the thick skins; the taste is much like that of young green peas as they are shelled from pods in the garden, and as opportunity presents one may gather a handful or pocket full of the green pods and nibble them from time to time, for the contents are dainty morsels whether eaten green or cooked. This we have learned in the Southwest from Mexicans and Indians alike. The wood of the Palo Verde is used by the Indians for fuel and for building their rude homes or huts. Rarely is it sold on the market for fuel, since it is considered undesirable for that purpose and when burning gives off a strong, unpleasant odor.

The scientist writing has succeeded through experimentation in germinating seeds of Palo Verde for more speedy growth: the seeds may be treated for four hours with concentrated sulphuric acid, washed in running water, preferably

warm water, to remove the last trace of acid; then after six to twelve hours the seeds will be seen to have already begun growth; and in the course of twenty-four hours from the beginning of the treatment the seeds will have sprouts a half inch long or longer! Once germinated under warm, moist conditions, such as our summer rainy seasons afford, the young plants make very rapid growth and within a few weeks the young tree will have roots that have penterated the soil to a depth of four to five feet or more, and a stem twelve to fifteen inches tall. If it is a Mexican Palo Verde there will be numerous three-prong spines which have developed from the petioles of the first young leaves of the stem. And now the young plant is established and on its way to become a beautiful desert tree with wide-spreading or ascending branches, intricately branched and a delight to behold, graciously offering shade to animals, homes for hawks and other birds in which to build their nests, and a haven for the weary, thirsty traveler.

Conclusion

Who knows but that in the desert-time of the long ago, or tribes and people of whom we know so little, who still live in caves of the mountains in their pueblos high up away from attack of beast or human enemy these wonderful shady and

Blue Palo Verde

(CERCIDIUM TORREYANUM)

Standing alone in the arid desert under the Eternal Sun, like a huge umbrella casting its peaceful shadows below—who knows but that underneath its beautiful shade, ancient Pueblans, sitting in friendly circle and smoking the pipe of peace, brought forth the first fruit of Man's Idea for cessation of hostilities, tribal or politic; thereby pointing the way to future disarmament among nations.

BLUE PALO VERDE (Cercidium torreyanum)

colorful trees did not play their part as the background in the pictures of early tribal love or warring strife; of lovers stealing silently down under the Palo Verde in the early dawn or evening to plight their troth or affection, or mayhap of warriors gathering in the shade of the Palo Verde out of the Sun's fiery rays to terminate a tribal war, or to bring peace from out strife and turmoil. Who knows but that a small handful of the first Palo Verde blossoms in the Spring of some long ago meant that festive season was at hand! or that the plentiful numbers of their blossoms foretold greater or less water for crops in the harvest time of bygone ages. Who knows? Only the God who constantly looks down on all these things with the guiding Hand which forms and guides all Nature, the Hand which created Man and for his happiness has made—a Tree.

"I think that I shall never see
A poem lovely as a tree,
A tree whose hungry mouth is pressed
Against the earth's sweet flowing breast;
A tree that looks at God all day
And lifts her leafy arms to pray;
A tree that may in summer wear
A nest of robins in her hair;
Upon whose bosom snow has lain;
Who intimately lives with the rain.
Poems are made by fools like me,
But only God can make—a Tree."

When the Ocotillos Bloom

(A very interesting plant that lives and thrives on the desert. A plant whose very life is a puzzle in the kingdom of botany.)

Introduction

THE Desert! with its vast dunes stretching out in limitless wastes of sand, and then sand and more sand. Only sand, you say! How unattractive! Well, come and see. See the great stretches of arid waste upon waste, the majestic mountains rearing their noble crests to the sky, far, far in the distance, hundreds of miles away, yet still visible to the naked eye across the limitless sea of sand! . . . Come and see, and feel the call of the Desert, and then perhaps you will understand.

Out on the bulwarks of the great American Desert there lives and thrives a most puzzling plant, in the kingdom of plants and flowers. His name is Ocotillo, or more commonly to his kind the *Fouquieria splendens,* and as such the scientist refers to him. Dressed in his armor of thorns and spines, he offers an impenetrable defense to the advance of man or beast. They just will go round him. In his domain of the desert, he is lord and

king; he and his kind. He is magnificent in the splendor of gorgeous beauty, dressed in full bloom! For then he is alluringly and attractively clothed with clusters of brilliant red flowers, converting the desert into a veritable flame of color! Yet in spite of his beauty and grandeur he is strangely forbidding. He waves his flaming red flowers as a sort of beckoning, but Man hesitates to accept the challenge.

When his life span is spent, he stands in silent solitude, an effigy to his past. Still defiant, his last stand is that of a hedge or fence for desert man and his requirements. Then it is that he seems to have lost his spirit of the desert, for he no longer challenges nor waves in the wind, but appears like "dumb, driven cattle," his mighty spirit broken!

When the afternoon shadows of the sun begin their long low slant that spells the end of a hot dusty day on the desert, and one has travelled weary hot miles, wishing that the trip were all over, has it ever come to mind that in those arid places, hot and dry and sandy and no water, apparently, that a world of plant life lives and thrives? In this very place you are in such a great hurry to leave, Nature has brought forth from her laboratory some of the most puzzling speci-

mens of plant life the botanist has ever contacted. Why some of them should be, is hard to conjecture, but Nature knows best and Man should not question her methods or motives.

Far out on the wide stretches of the Arizona Desert we see many curious specimens of a splendid, dignified plant with large clusters of flaming red flowers on the ends of long shafts or stems, waving stiffly to and fro in the soft warm winds, as though beckoning us to come and get acquainted; and looking into his family tree for pedigree, we find that he has several names, all familiar to the districts in his locale: Commonly he is known as Ocotillo, or scientifically as *Fouquieria splendens,* and he has been a puzzle to botanists to classify. At various times Ocotillo has been named as a member of the Phlox, Purslane, Orpine, Frankenia, and Tamarisk clans; and now finally he has been classified as a family all to himself, and scientists call him Fouquieria. Of the others mentioned he is most nearly related to the Tamarisk Family.

The Ocotillo is a popular plant as is indicated by the number of common names given to it. The favorite name is the Indian: Ocotillo. Even though not a cactus, it is sometimes called the Coach-whip Cactus; from the allusion to the long, slender staff-like stems it is called also

Jacob's Staff; and because of the flame-red flower clusters, the Candle-Flower or Candlewood Family.

Desert Habitats

We find that Ocotillo is a native of the United States and of Mexico; from western Texas on through to southern New Mexico, southeastern California along the Colorado River, and thence on into southern Arizona where it is most abundant in our country; around the Santa Ritas there when in bloom the scarlet blossoms give to the foothills and bahadas a flaming fiery appearance, as of a vast forest fire extending eastward as far as eye can see. Ocotillo is not known in any other section of the world except here in the great Southwest. It originated in Arizona and the adjacent area, and here it is typical. A very small family of plants, there being only four kinds of Fouquieria, and one other small group of one or two kinds, and its members are all closely related. They are very characteristic and produce a most striking landscape, thriving abundantly at and around the forty-five hundred foot altitudes, and then down to the lower stretches of desert habitats. Ocotillo likes the arid, sterile, gravelly or rocky foothills, and the gravelly limestone ridges of the desert areas where he is the most predomi-

nant and often the only shrubby plant. Sometimes these areas of Candlewood are several miles in extent, and the growth of the plant is thick and close. Then again, it is sparse, or grows in patches, and likes for a neighbor the Creosote Bush called the *Covillea glutinosa*. The Ocotillo delights to take possession of limestone foothills and mountain slopes, crowding out most other shrubby plants, and here in May and early June when the desert has lost much of its color, in most commanding views, he paints his last canvas for the season with his flaming red torches.

Unique Growth

The Ocotillo has usually a most unique spiral arrangement of its spines due to the slight twisting of the stems, the soft yielding young spines forming only toward the tips of the stems on the new season's growth; growing from special leaves whose smooth green blades abruptly incurve near their bases. In a remarkably short time they have changed from a soft petiole or leaf base into a hardened, sharp-tipped spike, half an inch long or longer, and turning to a beautiful purple-brown coloring. These spines are known as phyllodial thorns and are the only spines of Ocotillo.

Only in a very few other plant families do the spines develop from the petioles of leaves. It is

singular to the Ocotillo that he has two distinct kinds of leaves: one from which the thorns are developed, and the other the regular plant leaf, an inch or so in length. Clustering in the axils of the spines the bright green leaves put out, two or three days after a heavy shower, the entire length of the stems, which grow from a short thick base or trunk four to ten inches high, and with a diameter as great or greater; as many as seventy stems growing from a single trunk. The addition of young stems to the cluster of ascending or erect-ascending stems is in the form of a circle from the outside. And for protection against drought (how wise is Nature in her inexplicable ways and cunning methods of protecting her children) the leaves hastily disappear with the first suggestion of drought leaving the stalks naked and bare, defiant to wind and drought alike, for months in the hot sun! Ungainly stems, ten to twenty feet tall, like a bundle of bare sticks! and dressed only in an armor of thorns and spines Ocotillo defiantly points his spiked arms at the weary traveler, challenging all who approach and silently pass him by. His arms are soaked in resin, too, a further precaution of Mother Nature; and touch a match to one of them it instantly ignites and burns like a lighted

OCOTILLO, COACH-WHIP CACTUS, JACOB'S STAFF OR CANDLE FLOWER (Fouquieria splendens)

candle, increasing his forbidding aspect toward Man!

In Spring the scarlet flowers form one great mass of brilliant flame, glowing like lighted candles from the tips of the long stiff stems; and so the desert is illuminated with flaunting color when the Ocotillos bloom! . . . The brilliantly colored flowers are very faintly fragrant and there are from one hundred and fifty to three hundred flowers in a single flower cluster or panicle-like inflorescence; each flower including corolla and stamens, about an inch and a quarter long, and as many as three hundred to five hundred scarlet clusters on a single shrub! giving to the plant a truly flaming appearance. In the distance such a desert area looks like a vast fire, or sea of flame! They are very attractive to the eye, and their presence on the hot arid desert makes Ocotillo seem out of place. One would think, instead, that he belonged in some fine garden! The nectar from the flowers is very viscous, sticky or syrup-like when evaporated. It is colorless and sweet to the taste.

The Ocotillo reproduces only from seed in nature, and is very slow in growth. The seeds are white and silky, and have a long fringe of spirally thickened hairs. They are set free by the pods splitting open at the top.

We find the Fouquieria plants are spaced about six to twelve feet and reach a height of from eighteen to twenty feet, and sometimes higher. Out in the Arizona Desert where fences are scarce, and wire for fence-making is hard to get, the Ocotillo serves the desert-dweller very well for the purpose. The long stems are cut and inserted about twelve inches in the ground or soil, and from three to six inches apart, and supported with wire or strung with wire, if there is any to be had. This makes for an admirable fence, and if watered from time to time the stems will usually take root and start to grow, while stem and leaves will remain green as long as kept watered. Sometimes these will not start to root for two or three years, though still remaining alive. Others will root quickly at the cut ends, and these roots will spread out just under the surface of the ground, covering a great area. They never go down deep into the soil. This type of fence also makes a very good hedge, one that is impenetrable to man or beast.

Ocotillo's Peculiarities

There are some peculiarities of the Ocotillo that are worth mentioning: As an ornamental rock plant the Ocotillo is used very extensively in the Southwest. There is no very close relation-

ship of the Candlewood, as he is sometimes called, to any other plant family; his nearest relative is the Tamarisk. Erroneously is the Ocotillo referred to as a Cactus. It is not a Cactus. He gets this name from his long period of desert development, growing among or near the Cacti; association with like conditions often brings on a resemblance.

For ages the Pima and Papago Indians used the Ocotillo stems, cut in lengths of twelve to fifteen inches, and tied into bundles and dried, for candles and torches. As the desert supply was bountiful, they always had a goodly supply on hand. When the plant gets old and dies the central part of his stem disintegrates and leaves him a thick outer overcoat of resin from which merchants get some of their resin which is in demand for commercial purposes. This central cylinder of the Ocotillo's stems is soft and woody and soon decomposes or is eaten out by wood borers, leaving the outer resinous core which is impervious to water; and this will remain unchanged for many years, out there on the desert, long after the wood in the stem has disappeared. These resinous cores are used in the manufacture of varnishes, and are obtained in considerable quantities in Mexico where the Ocotillo plant growth is more abundant than here in the United States.

WHEN THE OCOTILLOS BLOOM

Out there on the great Arizona Desert, and close to the famous Superstition and Santa Rita Mountains we find Ocotillo standing in clusters or grouped in patches, or perhaps quite alone in many instances, in silent solitude, ominous of the presence of other desert plants; and there we must leave him, for in this great amphitheater of the sun he has been standing for ages with his brilliant upturned head, sunward, as if in the attitude of offering a serenade to high heaven, written in flaming red color! In the last of life he still stands a barrier, formidable to all, defiant to the end!

NIGHT BLOOMING CEREUS OR REINA DE NOCHE
(Cereus greggii)

Goddess of the Night

Introduction

IN the Infinite long ago, when the schedule of all things in life was laid down at the instigation of the Master-Mind to make this little world a fit place in which to live for His children, with divine patience and unlimited vision He fashioned the mountains and rivers, the plains and the deserts; and they must have looked barren and dank and dull, so He grew upon them His flowers, and He gave the mountains their views, and the birds their songs, and with the swish of His eternal paint brush the flowers received their colorings. Then He sprinkled them with dew and star-dust and so they have bloomed forever since. . . . After the desert twilight has begun to fade and the dusk has melted into evening and Night has set in, if you are travelling across the great Arizona Desert in June—in June time which is Springtime on the Desert, when the desert wild flowers bloom and those strange and lurid Cacti, fantastic creations of a vanished age, come back to us in bloom—you will be fortunate indeed. For about this time there will bloom on the desert one of the most exquisite flowers Nature in all her

fantastic beauty of design and colorful setting has yet produced, the most fragrant and pure of all lovely flowers, the queenly Night Blooming Cereus. You must come in the night, for the Queen of Desert flowers selects the soft shadows of the moonlit desert for the display and parade of her beauty; the Goddess of Night blooms and dies in the course of a single night, and is no more. And another year shall pass us by ere the beautiful moonlit Goddess again puts forth her evanescent loveliness and white fragrance for eye of man to behold, to stir the senses and lift the soul to ecstasy.

It is a curious fact in Nature that some of the most beautiful creations in the realm of plant life are to be found far out on the desert and away from the haunts of man or beast, where once discovered by man it gives him quite a little concern and much wonder as to why such places should be selected, and why such environments are built around the beauties Nature has tried, apparently, to hide away from view. Why, one may ask, do such beautiful flowers as these select the darkness of night to open their buds into bloom, only to die with the coming of the morning sun? Why should it require a year for Nature to gather together the physical forces necessary to form them into such beautiful shapes and

colors, and then forget them after a few short hours? . . . In the world of color and harmony there must be balance. There are extremes in all of Nature's handiwork, and this can be seen exemplified in the blooming of the *Cereus greggii*, when the fiery sun has passed the horizon and the cooler shadows of the night draw near. In the serious and complicated process of physical chemicalization, Nature found that she required a long time to bring about the beauty she desired. (Nature does that by process which we humans measure by time.) In that wonderful process, so intricate and weird to mortals here on Earth, so simple and easy of accomplishment for the Great Builder by which she brings sublime loveliness to the Queen among her desert beauties, Nature, the Great Architect, requires many months, twelve in number, to bring about her beauty of design, her exquisite setting for this her chosen Flower.

Then, one may ask, how can we recognize this specimen of loveliness in Nature's handiwork, the Night Blooming Cereus, when not familiar with her especial type of beauty and grace of form and fragrance? There are two outstanding characteristics which will identify her: Since she blooms only at night and the white brilliance and beauty of her flowers is very conspicuous

and distinctly seen in the desert night-light, they attract attention because of this one sublime attribute. This conspicuousness of her flowers in bloom at night projecting from their slender snake-like arms, gives her an appearance that is visible for long distances on the desert. Again, there will be wafted across the balmy desert air of the late evening a rather strong snappy scent as of freshly gathered spices. This is the aroma of the Night Blooming Cereus just come forth into bloom; and now she is telling the world, "Well, here I am, and I'm on time too." . . . If one has access to a flower garden in which the cultivated plants are grown and knows the plant, and will watch for the flower-buds to develop, it will not be hard to locate them on the desert and the night when she will bloom.

Striking Growth

The Night Blooming Cereus is a flower of such indescribable beauty that it is quite surrounded with romance. Festivity was occasioned around the old Spanish *haciendas* and Indian pueblos in Mexico and southern Arizona with the opening of the buds which takes place in the late afternoon of the night of opening, while in far away Hawaii grand fiestas and great jubilation among the aristocrats of Queen Liliokulani's

reign in Honolulu celebrated the blooming of their particular species of the flower queen. There are records of house warmings and parties gathered in the afternoon and evening in honor of the Goddess of the Night, and many a heart is broken or Indian romance fulfilled when the Night Blooming Cereus blooms. The plants are watched carefully during many days and weeks beforehand for the tell-tale signs. The buds develop very slowly and for weeks before full bloom the growth is scarcely noticeable, but a few days prior to blooming they grow very rapidly, sometimes as fast as two or three inches in twenty-four hours! the greatest growth just before opening. It is just at sunset when the lengthening shadows of the desert go forth to play hide and seek among the creations of the fantastic clan, and all earth is bathed with the blue haze settling over yon mountain crests that the exquisite flowers begin to unfold as the plants become shaded near the beautiful sunset hour, opening quite fully in the course of an hour! during which time the petals pass through an arc of from ninety to a hundred and twenty degrees, when they are quite recurved. So rapid is this movement that one can observe it without difficulty, watching the large white petals unfolding before our eyes. However the flowers

really are not fully open for two or three hours and the petals, styles and stamens gradually continue to elongate during this time.

The flowers open and close with clock like precision. In the morning at seven-thirty almost to a minute they begin closing and are not fully shut until nine or nine-thirty o'clock. At first they fold up very rapidly and by watching carefully one can see the petals and sepals gradually moving toward the center and closing. The greater part is over in an hour, though it is not until twelve o'clock that the beautiful pure white petals shut *tight* and we see them no more until another year has passed us by, for after once folding up, the flowers never open again the same season, due to the slow growth of cell structure which Nature requires to produce her beauty in this Queen of Desert Flowers. The flowers exposed to the brightest sunlight close first with one or two exceptions; if gathered and put in a dark chamber or cool refrigerator they close just the same soon after those left on the plant in the hot sun. So Nature with exact precision and careful forethought sees to it that her ends shall be fulfilled, and little notice she takes here of Man's feeble attempts to thwart or aid her work.

Our Night Blooming Cactus exemplifies the spirit of the desert. The flowers open during the

hottest driest part of the year and during the period of longest days, from June 15th to June 25th. Rarely do they blossom later than this. Plants in cultivation with irrigation in our hothouses and beautiful gardens, and plants growing on the desert without irrigation nor any other aid from the hand of man commonly blossom on the same night or occasionally within a period of two or three days. Usually all the flowers on each plant in a community blossom the same evening. Flowers on the desert near old Fort Lowell and in many other localities near Tucson, Arizona, blossomed in great profusion on the night of June 23rd this year, along with those on the University of Arizona Campus and in numerous other gardens in the city of Tucson the same evening. Ninety five to ninety-eight per cent of the blossoms open on one night and the remainder the following evening; and since those of her flowers on the desert growing among bushes without cultivation and certainly with less moisture than those growing in yards with unusual care, cultivation, and irrigation blossom the same night as the cultivated plants, we see that culture and irrigation do not alter their time of blossoming in the season, which seems to be influenced only by the one factor common to all plants in a community: Nature's provision for

great length of sunshine hours in the day. It is believed that the Night Blooming Cereus like some other tropical and subtropical plants blossoms only on the longer days of the year; this is now known to be true, for certain flowers if grown in a climate where the days are short contrary to Nature's mandate, have no chance to put forth their beautiful blossoms and consequently in this changed environment they never bloom at all!

And how is it, one may well ask, that the beautiful flowers open just as quickly with no less exquisite fragrance and lovely coloring out in the hot sun, exposed to wind and drought alike, as in our beautiful irrigated gardens where they receive the most scientific cultivation and the best of care? Ah, it is Nature, the Great Builder, who takes care of her plant children and provides for their welfare; with marvellous ingenuity and infinite wisdom far surpassing Man's attempts in the realm of Science, she builds a most remarkable structure for this Queen of our fantastic clan, the Cacti of the Desert! The flowering blooms swaying on the angular, blackish, snake-like arms of their grotesque trunk which looks more like a crooked dead stick or strangled snake than a living stem, are protected from the wind and occasional storm which howls through the

desert at times by the creosote bushes, cat's claw or mesquite trees among which Nature places our flower goddess for safety. The apparent rarity of the flower is due in part to this oddly shaped inconspicuous stem which is wider a couple of feet above the ground (about three-fourths of an inch in diameter here) than at its base, seldom more than a third of an inch through; we find this same characteristic in her Big Brother, the giant Sahuaro, another member of the fantastic Cactus clan. This *Cereus greggii* stem grows from two to eight feet tall, the long slender arms commonly extending upward about three feet from the ground, however, the taller plants are rare; it is loosely branched, often with but one or two flexuous, half-climbing, divergent branches, with a strong central core to withstand the violent winds which sweep the desert at times, a stout woody cylinder about a quarter of an inch in diameter, and with a series of sharp ridges and shallow furrows running the entire length of the trunk, by means of which the plant gains access to the water in the roots through transpiration. The main root is located fifteen to eighteen inches below the surface of the ground and from this point the stem grows upward; the former growing from four to ten inches in diameter and ten to twenty inches long

or longer, usually not branched. This fleshy part is so far down in the ground that often the moisture from the summer rains does not reach it; in which case small rootlets reach upward from its top to the moisture in the ground above, for roots grow primarily in the direction of moisture. This large fleshy root often fifty to a hundred pounds in weight, the great main root of the plant, is a storage reservoir for plant food and water kept filled for six months or a year at a time! which renders the plant quite independent of rainfall during its period of growth, and hence it never flowers out of season! Rain or shine these exquisite flowers, lovers of the Night, come forth at their appointed hour perfuming the vast arid wastes of the Desert with their fragrant loveliness, and pass on; like Angels of the Night sent to point the way to Paradise. So that even without a drop of rain for a year at a time during the long dry seasons of no-man's land, the arid wastes will bloom with moonlit blossoms! when it is Springtime on the Desert.

Beautiful Flowers and Spines

The Night Blooming Cereus is one of the finest of all our wild flowers, and one of the shortest lived. Its outline is extremely graceful and pleasing with a rather heavy spicy fragrance, which

perfumes the air all about with a delightful, slightly lemon odor between the aroma of a magnolia and a cape jasmine, occasionally persisting until the flowers close in the morning. The lovely perfume is different from that of any other flower and one can only appreciate it by inhaling and enjoying it; and it is during this single night of her short life that our lovely Goddess gives of her fragrant sweetness to night flying insects, who literally drink it in, carrying the honeyed pollen far and wide. There are no harsh colors nor color clashes in the flower; the large spreading blossoms are a lovely soft waxy white indescribably beautiful, the color harmonies delicate, the flower parts graceful, the corona or stamens almost transparent. The beautiful purple-brown of the ovary and calyx tube gradually merges into soft white in the inner petals, the outer petals having a very delicate tint of pale lavender. Both sepals and petals are long and gracefully recurve in mature flowers giving a cornucopia effect which is most pleasing, and the numerous cream colored stamens form a corona which extends for more than an inch beyond the petals in a fully opened plant, also enhancing the beauty of the flower. When entirely open the blossoms are seven to nine inches long, four to nearly six inches across;

since this plant has no use for leaves as do other species, there are none present except a few lance-shaped pinkish bracts that grow on the flower parts, terminating the tubercles on the cornucopia and gradually passing into the sepals by regular gradations.

It seems that the *Cereus greggii* depends upon its inconspicuous habitats for safety, rather than upon its soft weak spines growing on the lower half of the calyx tube, or the inch-long wiry hair-like spines more or less brittle and barbellate, appearing on the upper part. The areoles of the flowers (an eighth inch long) are densely tufted or felted with grayish white hairs, elliptical in outline, and growing eight or nine short stout radial spines, their bases swollen and blackish, and a single row of central ones, erect with flask-shaped bases, then the long white deflexed barbed spines, the whole resembling very much a flattish insect of the desert. The short stout spines with swollen bases grow also on the soft fleshy fruit, a scarlet pulpy mass about the size and shape of a hen's egg or bright red Easter egg, with a long pointed withered tip. The fruit matures in September or October and is food for birds and small rodents, a tasty morsel and a rare delicacy among humans, seldom abundant enough to be used commercially.

Legends and Habitats

Because of the odd and grotesque growth of the stem and the rare beauty of the flower, the Night Blooming Cereus is one of our most popular cacti for rock gardens, and no cactus garden is considered complete without a specimen of this plant; there are occasional gardens with fifty or more plants of the Queen of Desert Flowers. It is perhaps more abundant on the desert in the vicinity of Tucson, Arizona, than in any other part of the country and is much grown in cactus gardens in Tucson. The *Cereus greggii* prefers deep sandy loamy soil on desert slopes with good drainage and will not grow in clay soils at least in strong clay soils, nor in soil with poor drainage or that is subject to occasional flooding. Never found in abundance, usually alone or with but a few companions she clings to the lower mesas among the mesquite, creosote bushes and other desert shrubs which offer the beautiful flower queen their support and protection from wind and storm. Very rarely she ventures forth as far up as five thousand feet on the foothills and lower mountain crests, generally speaking she seeks the medium levels, and some of the flowers are found in the vicinity of Yuma, Arizona, as low as five hundred feet above sea level. One of the writers has seen the beautiful blossoms open-

ing on the single night of their short span of life just at sea level, down in Florida in the Indian River country and along the St. Lucie in the southern counties, a different variety however from the one in our great Southwest, and from the species in Honolulu which flourishes pretty well all over Hawaii; and another of the writers counted as many as fifteen blooms flowering on one plant in Arizona this year; we may find the Cereus blooming too in other of our southwestern states and native to the Mexican and South American countries, where she has been ever the source of great jubilation and widespread celebration among the native peoples, more highly revered by the Mexicans than any other desert flower, as well as a great favorite among the early whites.

The Mexicans call her "Reina de Noche," Queen of Night, in token of their great admiration and love for the flower goddess and the reverence with which they regard her. For there is a tradition among them going back for two hundred years or more that the Night Blooming Cereus blossoms forth on San Juan's Day, the birthday of St. John the Baptist, which falls on June 24th. Only this year in the Arizona University gardens and other cactus gardens of Tucson, the Queen of the Desert came forth for over

half her entire time of flowering on St. John's Day, a gorgeous display of hundreds and thousands of magnificent bloom in the city and far out on the desert mesas, so that the atmosphere for miles around was perfumed with the delicate fragrance of the beautiful blossoms surpassing in loveliness and fragrant sweetness lilies, irises, roses, and numerous other beauties of the Great American Desert.

It is little wonder that Indians as well as Mexicans hold in reverence a favorite which celebrates with her blooming the birthday of St. John the Baptist, or the twenty-fourth of June; for it is upon this day that the sun worshippers among the Arizona Papago Indians were accustomed to holding their grand fiestas and pagan dances with a continuous round of feasting, dancing, and prayer for rain and good harvests to the Great Spirit of Indian Land. And the Great Spirit never failed them legend tells us, so long as petitions were prayerful and ceremonies pleasing to the eyes of the mighty Ones on High; but later when modern thought was introduced with merry making and present day celebration taking no thought for the spirit of prayer, the gods were angered, and no rain comes now on San Juan's Day to fill the heart of the Indian with joy and hope and faith, and to bring new life to the

Desert land of plants and flowers. . . . But the Goddess of the Night goes on her sweet way rejoicing and little she cares if the gods frown or the Mighty Ones smile, for rain or shine she sends forth her beautiful flowers in one gorgeous array of fragrant loveliness, blossoming forth over the limitless sea of sand despite long seasons of fiery drought, and bringing the vast arid wastes into beauteous bloom—when it's Springtime on the Desert.

Conclusion

WHEN one mentions the word "desert" to those who have never seen it, conception and appreciation are lost, for the desert must be seen to be understood; and a visit once paid to the limitless expanse of no-man's land leaves its lasting effect, to such an extent that there never fails a desire to return. There are those who always return; for the desert is contagious. It has its charm,—the charm that calls you back. The desert is a beautiful place in all its solitary loneliness; it is the great out-of-doors of Life. Nature did not forget to decorate the landscape with pretty flowers and most beautiful trees, but they are flowers and trees that will grow only there in the vast arid spaces of the Great American Desert. They are beautiful in their simple designs and colors. They are hardy, and they have to be, for out there in the hot sun must they live and thrive.

And now our Tale is done, the hidden wonders which God bestowed upon our so-called "No-Man's Land" are brought forth from out their hiding places in this realm of living beauty, our Desert Land of Plants and Flowers. For the

desert is the Studio of the Gods. It is there since Time eternal they have worked ceaselessly upon the sculpture which has defied Man throughout the ages; and it is there that Man is now looking for the mysteries of Life. The sculpture left by the Gods is a majestic picture painted on the vast canvas of the desert and set with a fringe of flowers and plants, the like of which is to be found nowhere else in the world. We have done our little mite to show you, dear reader, this realm God has *not* forgotten; but it is not enough, you must come and see, to appreciate the hidden magic of the Desert. For remember:

> "If you have not, then I could not tell
> For you could not understand."
>
> *Lure of the Desert.*

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